

ABSTRACT

Combined laser-based apparatus for determining both altitude and ground velocity of an aircraft comprises: a laser source for emitting pulsed laser beams substantially at a predetermined wavelength; a plurality of first optical elements for directing the laser beams from a first optical path to a second optical path which exits the first optical elements; a plurality of second optical elements configured to form a telescope, the second optical path and telescope field of view being fixedly co-aligned; an optical scanner for directing the second optical path and telescope field of view to desired ground positions while maintaining the co-alignment thereof; the telescope for receiving Doppler wavelength shifted reflections of the pulsed laser beams and directing the received ground reflections substantially over a third optical path; an optical filter element for separating the ground reflections of the third optical path into first and second portions that are dependent on the Doppler wavelength shift of the ground reflections; and processing means for determining altitude and ground velocity of the aircraft based on the first and second portions.